Drexan Energy Systems Inc.

SPECIFICATION

Self-Regulating Heating Cable

PipeGuard® Hot

CONTENTS

1. SCOPE

This specification covers the requirements for self-regulating heating cables for pipe tracing applications.

2. PRODUCTS

2.1 OVERVIEW

2.1.1 Self-regulating heating cable shall vary its power output relative to the temperature of the surface of the pipe or vessel. The cable shall be designed such that it can be crossed over itself and cut to length

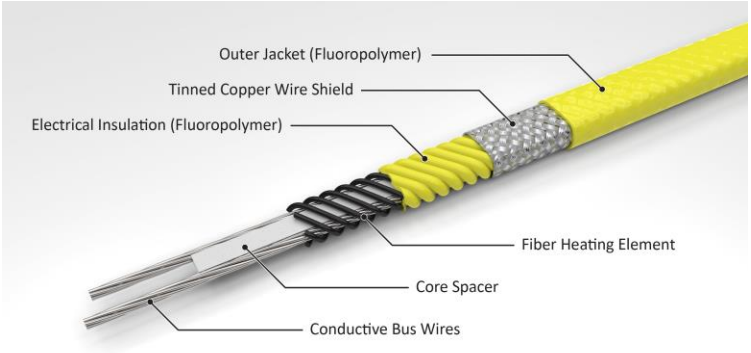
2.1.2 All cables shall be capable of passing a 1.5 kV dielectric test for one minute after undergoing a 7 J impact (CSA C22.2. No. 130-03, 6.2.10).

2.1.3 The heating cable shall be PipeGuard Hot self-regulating heater, with the intermittent exposure capability up to 482°F/250°C

2.2 CONSTRUCTION

2.2.1 The heating cable shall consist of two 14 AWG or larger tin-plated copper bus wires, separated by a fluoropolymer spacer and helically wrapped with a self-regulating fluoropolymer fiber that controls power output so that the cable has unconditional temperature identification number (T-rating) of T3 (392°F/200°C) to T2C (446°F/230°C) without use of thermostats. The heating cable shall have a tinned copper braid with a resistance less than the heating cable bus wire resistance as specified in ASTM B193 (CSA,C22.2, No. 130-03 Clause 4.3.4.1)

2.2.2 The braid shall be protected from chemical attack and mechanical abuse by a modified fluoropolymer outer jacket



2.3 PRODUCT CHARACTERISTICS

2.3.1	Minimum bend radius @ 68˚F/20˚C	1.18 in. (30 mm)
2.3.2	Weight (nominal)	1.2 lb./10 ft. (185 g/m)
2.3.3	Heating cable dimensions	0.47 in. x 0.31 in. (11.6 mm x 7.5 mm)
2.3.4	Bus wire size	14 AWG
2.3.5	Outer jacket color	Yellow
2.3.6	Supply Voltage	
	• Pipeguard Hot-1SJ	100-130 VAC
	• Pipeguard Hot-2SJ	200-277 VAC

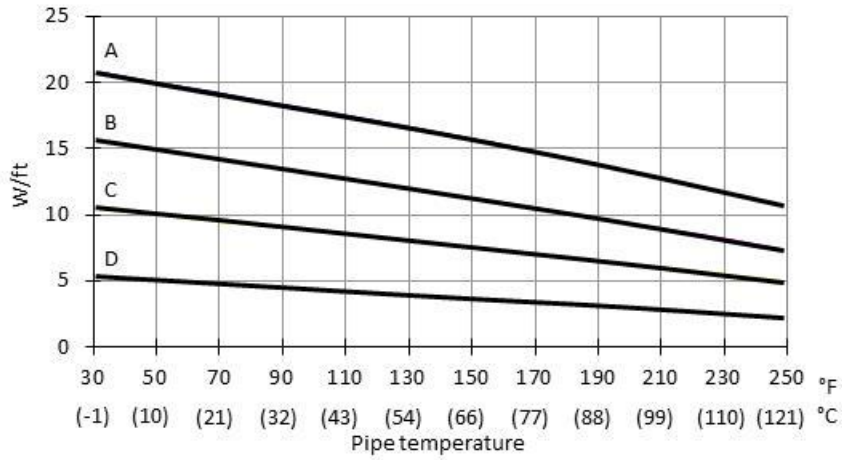
2.4 TEMPERATURE RATINGS

2.4.0	Maximum Maintain Temperature	250°F/121°C
2.4.1	Maximum Intermittent Exposure Temperature	482˚F/250˚C
2.4.2	Temperature ID Number (T-Rating)	
	• PipeGuard Hot 20-2SJ	T2C: 446°F/230°C
	• PipeGuard Hot 20-1SJ, 15-1SJ	T2D: 419°F/215°C
	• PipeGuard Hot 15-2SJ, 10-2SJ, 5-2SJ	T3: 392°F/200°C
	• PipeGuard Hot 10-1SJ, 5-1SJ	T3: 392°F/200°C
		Temperature ID numbers are consistent with applicable electrical codes
2.4.3	Minimum Installation Temperature	-40˚F/-40˚C

2.5 NOMINAL POWER OUTPUT RATING ON METAL PIPE AT 120V/240V

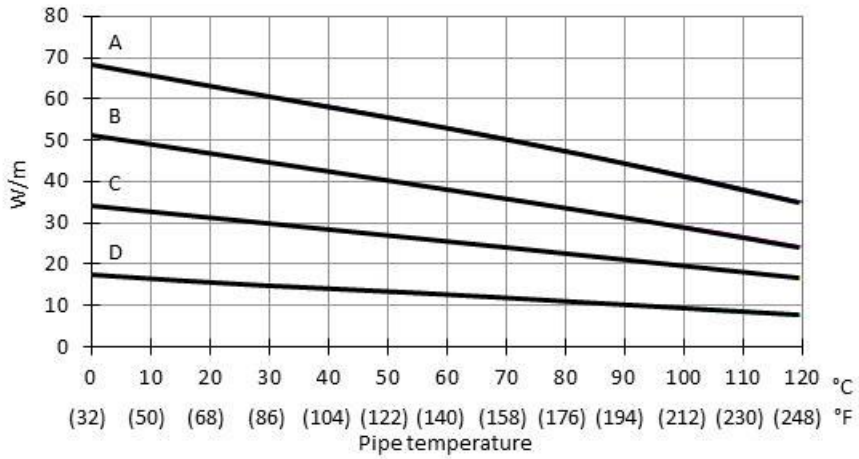
[A] 20-1, 20-2
20 - 24 W/ft. @ 50˚C
65 - 79 W/m @ 10˚C

[B] 15-1, 15-2
15 - 18 W/ft. @ 50˚C
49 - 59 W/m @ 10˚C



[C] 10-1, 10-2
10 - 12 W/ft. @ 50˚C
33 - 39 W/m @ 10˚C

[D] 5-1, 5-2
5.0 - 6.5 W/ft. @ 50˚C
16 - 21 W/m @ 10˚C



2.6 ADJUSTMENT FACTORS

	Power Output	Circuit Length
208V		
5-2	0.89	0.94
10-2	0.89	0.96
15-2	0.91	0.94
20-2	0.93	0.93
277V		
5-2	1.18	1.02
10-2	1.11	1.02
15-2	1.07	1.03
20-2	1.09	1.07

2.7 MAXIMUM CIRCUIT LENGTH BASED ON CIRCUIT BREAKER SIZES

For on metal pipes

Maximum continuous circuit length per circuit breaker (feet)

	START-UP AMBIENT TEMP		120V					240V				
	˚F	˚C	15A	20A	30A	40A	50A	15A	20A	30A	40A	50A
PGH5	50	10	210	285	375	375	375	425	570	750	750	750
	32	0	205	270	375	375	375	410	545	750	750	750
	14	-10	195	260	375	375	375	390	520	750	750	750
	0	-18	185	250	375	375	375	375	505	750	750	750
	-20	-29	180	240	360	375	375	360	480	720	750	750
	-40	-40	170	230	345	375	375	345	460	690	750	750
PGH10	50	10	115	155	235	280	280	235	315	470	560	560
	32	0	110	150	225	280	280	225	300	450	560	560
	14	-10	105	145	215	280	280	215	290	435	560	560
	0	-18	105	140	210	280	280	210	280	420	560	560
	-20	-29	100	135	200	270	280	200	270	405	540	560
	-40	-40	95	130	195	260	280	195	260	390	520	560
PGH15	50	10	75	105	155	210	230	155	210	315	420	460
	32	0	75	100	150	200	230	150	200	305	405	460
	14	-10	70	95	145	195	230	145	195	290	390	460
	0	-18	70	95	140	190	230	140	190	285	380	460
	-20	-29	65	90	135	180	225	135	180	270	365	455
	-40	-40	65	85	130	175	215	130	175	260	350	435
PGH20	50	10	50	70	105	140	175	120	160	240	320	385
	32	0	50	65	100	135	170	115	150	230	305	385
	14	-10	45	65	95	130	165	110	145	220	295	370
	0	-18	45	60	95	125	160	105	145	215	290	365
	-20	-29	45	60	90	120	155	105	140	210	280	350
	-40	-40	45	60	90	120	150	100	135	205	270	340

3. TESTING

3.1 INSPECTION ITEM AND FREQUENCY

- Product code — All
- Product length — All
- Appearance — All
- Cable dimension (width and thickness) — Each lot
- Power Output — Each coil
- Dielectric withstand — All
- Insulation resistance — All

3.2 INSPECTION REPORT

The inspection report, that is written with the test results (as described above) is attached to the product for each shipment.

4. MARKINGS

DREXAN VANCOUVER CANADA HEATTRACER PIPEGUARD HOT w-vSJ PARALLEL HEATING CABLE MAX xxxVAC 40A vW/FT @50F (zzW/M@ 10C) [CSA] CUS HAZLOC CI D1/2,GRP A,B,C,D,CII D1/2 GRP E,F,G, CIII Tn –G CE 0518 SIRA 12ATEX3095X Ex II 2G Ex e IIC Tn Gb MIN INSTALL -40C WARNING: REFER TO INSTALLATION INSTRUCTIONS LOT NO. xxyyzz ####M I (####FT I on other side)

- The address and trademark is "DREXAN VANCOUVER CANADA V6E 4L7 HEATTRACER"
- The model and reference number, as "PIPEGUARD HOT w-YSJ PARALLEL HEATING CABLE"
- The rated voltage and the rated current, as "MAX xxxVAC 40A"
- The rated wattage, as "yW/FT @50F (zW/M@ 10C)"
- The CSA trademark, class, and division as "[CSA monogram] CUS HAZLOC CI D1/2,GRP A,B,C,D,CII D1/2 GRP E,F,G CIII
- The maximum surface temperature code as "Tn" (see chart)
- The environment of use as "-G"
- ATEX markings as CE 0518 SIRA 12ATEX3095X Ex II 2G Ex e IIC Tn Gb
- The Min. install temperature as: MIN INSTALL -40C
- The words "WARNING: REFER TO INSTALLATION INSTRUCTIONS"
- The month and year of manufacture, date code, as "LOT NO. xxyyzz"
- The spool length index indicated as "####M I" and "####FT I" listed on the other side.

Model	**w-y** SJ	**xxx** VAC	**y** W/ft.	**zz** W/m	T**n(n)**
5-1	5-1	120	5	16	3
10-1	10-1		10	33	3
15-1	15-1		15	49	2
20-1	20-1		20	66	2
5-2	5-2	277	5	16	3
10-2	10-2		10	33	3
15-2	15-2		15	49	3
20-2	20-2		20	66	2

5. PACKING

Ends of each product must be covered by end caps. For packaging, customer specified label must be applied to the carton box.

6. GENERAL:

Furnish, install and commission a complete ANSI/IEEE Std. 515 (U.S.) or CSA/CUS Std. C22.2 No 130-03 certified trace heating system comprising self-regulating heating cables, connection components, and monitoring and control panels for the purposes of:

a. **Freeze protection and process temperature maintenance with exposure to steam.**
b. Viscosity control for ease of flow for fuel oil, grease and other higher specific gravity products
c. Any other process line, tank or accessory requiring a safe, easily installed heat source.

1. PipeGuard Hot Self Regulating Heating Cable

a. Construction - self-regulating heating cable shall be:
   i. A parallel circuit consisting of (or comprising) two (2) 14 AWG nickel plated copper bus wires separated by a fluoropolymer spacer and wrapped with a self-regulating fluoropolymer fiber that controls the power output.
   ii. The cable shall have a tinned copper braid, for grounding, encased in a fluoropolymer over jacket.
   iii. The cable shall be capable of being cut to length and powered and terminated in the field by qualified personnel.
   iv. The heating cable shall be Drexan HeatTracer PipeGuard Hot Cable capable of intermittent exposure temperature to 482˚F (250˚C).
   v. For service where the cable jacket is exposed or could potentially be exposed to hydrocarbons (fuel lines, grease lines) the outer jacket shall be fluoropolymer <Drexan SJ Jacket>.
b. Performance:
   i. Wattage output of self-regulating cables shall vary along the linear length of the cable in response to, and in direct proportion to the temperature in immediate proximity (or in contact with) the cable.
   ii. Rated output shall be -0 to +20% of published rated output as stated in catalogue and so marked on cable.
   iii. The cable shall be capable of operating at 120, 208, 220, 240 or 277 volts without use of a transformer.

c. Warranty: Self-Regulating Cable shall be furnished with a standard 3 year warranty against defects in workmanship and product quality.

2. Components

Drexan HeatTracer power connections, splices and end seals must be used, as per installation instructions, with the Drexan HeatTracer cables to ensure product performance criteria and to comply with requirements of warranty, codes and approvals.

The connections components shall be one of the following varieties:

   i. Metallic assemblies
   ii. Polymeric quick connections

3. Monitoring and Control (choose either a. or b.)

a. Electronic Monitoring and Control Panel: **RECOMMENDED**
A programmable, solid-state Heat Tracing Monitoring and Control Panel shall be installed to provide the following System Fault Alarms:

   i. Breaker off or tripped
   ii. Heater continuity or low current
   iii. Ground fault trip
   iv. Low temperature
   v. High temperature
   vi. Sensor fault
   vii. The panel shall include:
      - DC or AC alarm output for PLC or remote alarm indication.
      - A viewable LED Alarm indicator shall be on the door of the enclosure.
      - The panel shall be a weatherproof, NEMA-4X enclosure.
      - The panel shall exercise dormant heat tracing systems every 24 hours for early warning to prevent shut-downs.

b. Mechanical Thermostat Control: **ACCEPTABLE ALTERNATIVE**
A fixed set point or adjustable thermostat shall be installed to control the heater either directly or through a contactor. The thermostat may be either ambient or line sensing.

Note: Alarm relays: where required by applicable law, alarm outputs may also be required.

Note: In all applications the heating cable circuit shall be protected with ground fault equipment in accordance with National and Canadian Electrical Codes.

7. INSTALLATION AND COMMISSIONING:

1. Trace heating cable and cable connection components shall be installed in accordance with Manufacturer's Installation Instructions, including compliance with maximum circuit lengths for the selected breaker size and the design ambient start-up conditions.

2. Heating cable shall be affixed to piping using fiberglass tape or nylon cable ties. Polyvinyl electrical tape and metallic pipe straps shall not be used.

3. Safety labels shall be affixed to the exterior of the insulated line.

4. The system shall be considered acceptable when all of the following conditions are met:
   a. Heating cable has been correctly installed
   b. Connection components have been correctly installed
   c. Trace heating lines are insulated
   d. Monitoring and control panel has been correctly installed
   e. Monitoring and control panel has been correctly programmed
   f. Power has been applied to the trace heating control panel
   g. Trace heating control panel shows no alarms
   h. All of the above are certified by a representative of the manufacturer or an approved contractor.

Note: if thermostat and ground fault breaker are installed, then continuity must be confirmed after installation of insulation.